Space Weather Forecast

Issued on Saturday, 13 May 2023 at 13:05 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Slight chance of further Minor geomagnetic storms (G1) over UTC weekend. Chance of Minor/Moderate radio blackouts decreasing slightly into new week.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity reverted to low in the past 24 hours despite the eruption of a long duration flare falling short of moderate at 13/0044UTC. There are currently up to nine sunspot regions on the visible disc, one of which is a new unnumbered bipolar group developing in the southwest. Most regions are in apparent areal decay and not evolving much in terms of magnetic structure. A few spots were observed developing in two groups in the northeast but this happened at the detriment of others which faded almost simultaneously.

An explosive CME was observed off the western limb at around 13/0012UTC, originating from a sunspot region that is about to rotate onto the far side. Its analysis revealed that it is not Earth-directed. There were other CMEs observed in imagery, including from behind the north-eastern solar horizon, which may herald the arrival of a new sunspot region, while a partial halo heading south and west later in the UTC afternoon was determined to be far-sided - to no effect at Earth.

Solar Wind / Geomagnetic Activity: The solar wind was suggestive of the tail-end of a magnetic cloud. The solar wind speed was elevated initially, around 550-580km/s, but declined progressively during the second part of the period, down to 440km/s. The number of particles comprising the solar wind was above average at first but declined erratically into the UTC evening and then more gradually into the UTC night and morning. The magnetic field associated with the solar wind was similarly slightly enhanced and behaving rather chaotically at first but became smoother and weaker over time, with its north-south component remaining largely weak whilst displaying a fairly strong co-aligned bias with Earth's magnetic field.

The net result of the above solar wind measures was a mostly Quiet geomagnetic activity although one Minor Geomagnetic Storm G1 interval (Kp 5) occurred between 12/1200-1500UTC, coinciding with an anti-aligned Bz component while the solar wind speed and density were still enhanced.

Energetic Particles / Solar Radiation: Solar radiation levels remained at background level through in the period, with no storms in evidence.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a chance of returning to moderate, with this risk greatest over the current UTC weekend while the most complex sunspot remains on the facing side, else tentatively falling a little into the new working week, with no major returning regions expected.

Solar Wind / Geomagnetic Activity: The 09 May full halo CME that arrived at Earth yesterday

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(12 May) has now largely passed, with the solar wind speed in decline. A further CME was observed following the M2.1 flare that occurred on 11 May in the southwest quadrant. It may glance the Earth on 14 into 15 May, but with very low confidence. Finally, the explosive CME that has recently been observed (originating from a sunspot region near the western limb) has been analysed and is not considered to contain any Earth-directed component.

With little on the disc coronal hole-wise, geomagnetic activity should remain predominantly Quiet. However the slight chance of a G1 (minor) storm interval cannot be completely ruled out given the existence of the CMEs previously mentioned, at least during the next three days.

Energetic Particles / Solar Radiation: Solar radiation storms are rated at a daily Slight Chance of S1, decreasing slightly into the new working week as the main sunspot responsible for this risk crosses the western solar horizon and rotates away.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	10	10	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	40	40	30	30
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	20	15	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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